

INVESTIGATION OF LASER RADIATION DYNAMICS IN SEMICONDUCTORS DUE TO PICOSECOND ELECTRON BEAMS AND ELECTRIC FIELD PULSES

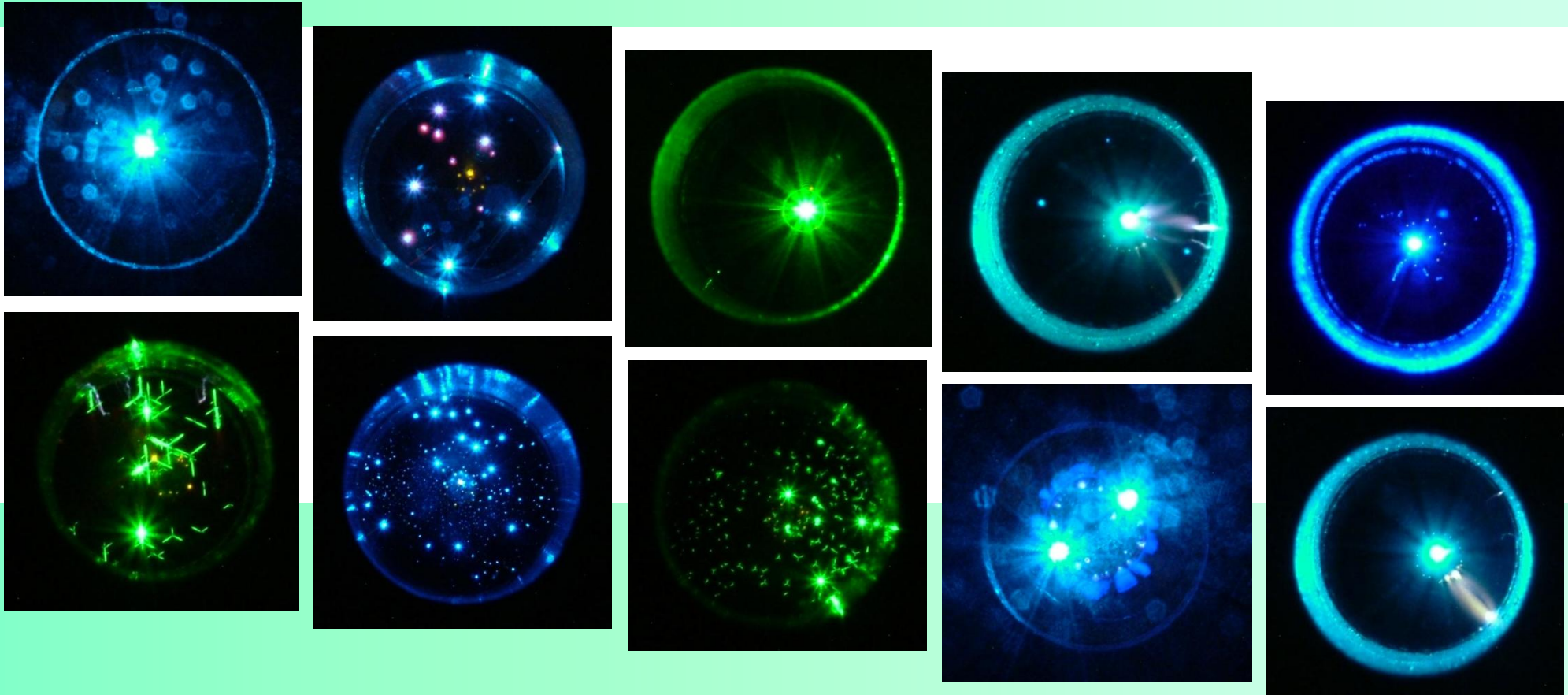
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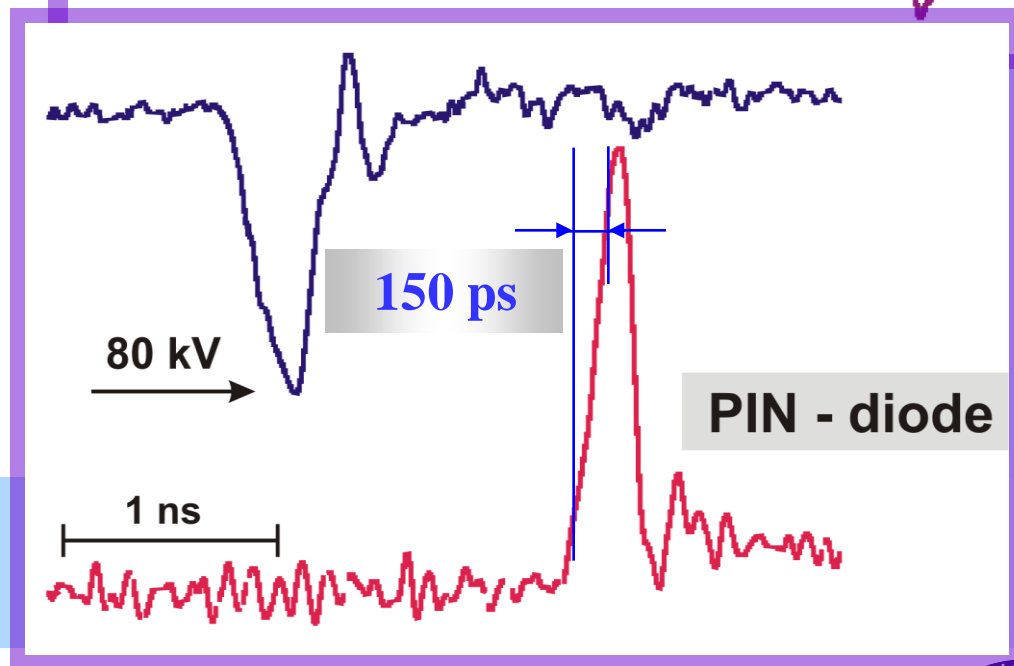
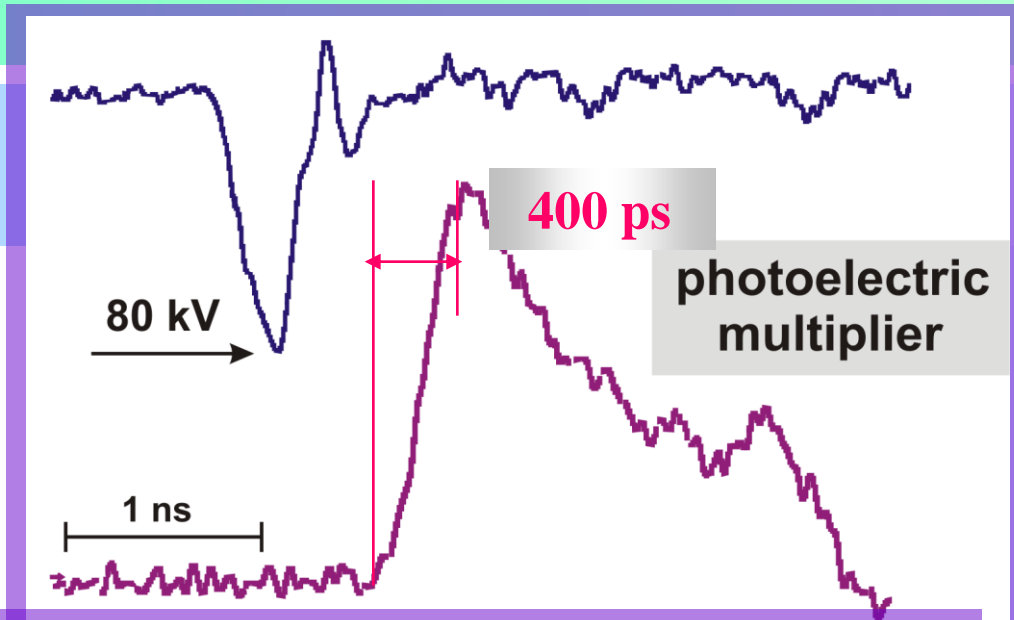
Lebedev Physical Institute RAS, Moscow



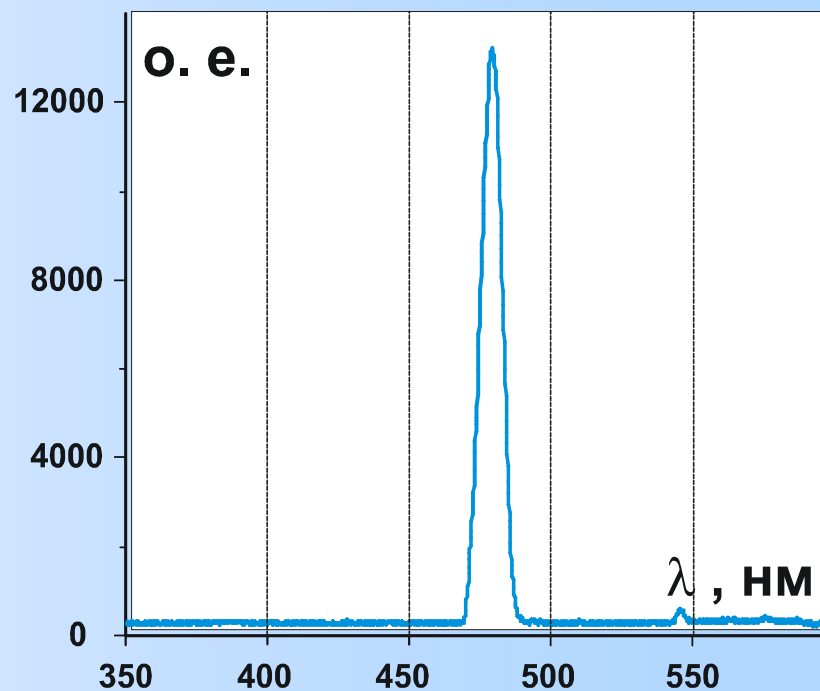


Laser generation is possible in semiconductors under the action of electron beams and electric field pulses. By following specified requirements for investigated samples and pumping pulse parameters laser radiation appears.

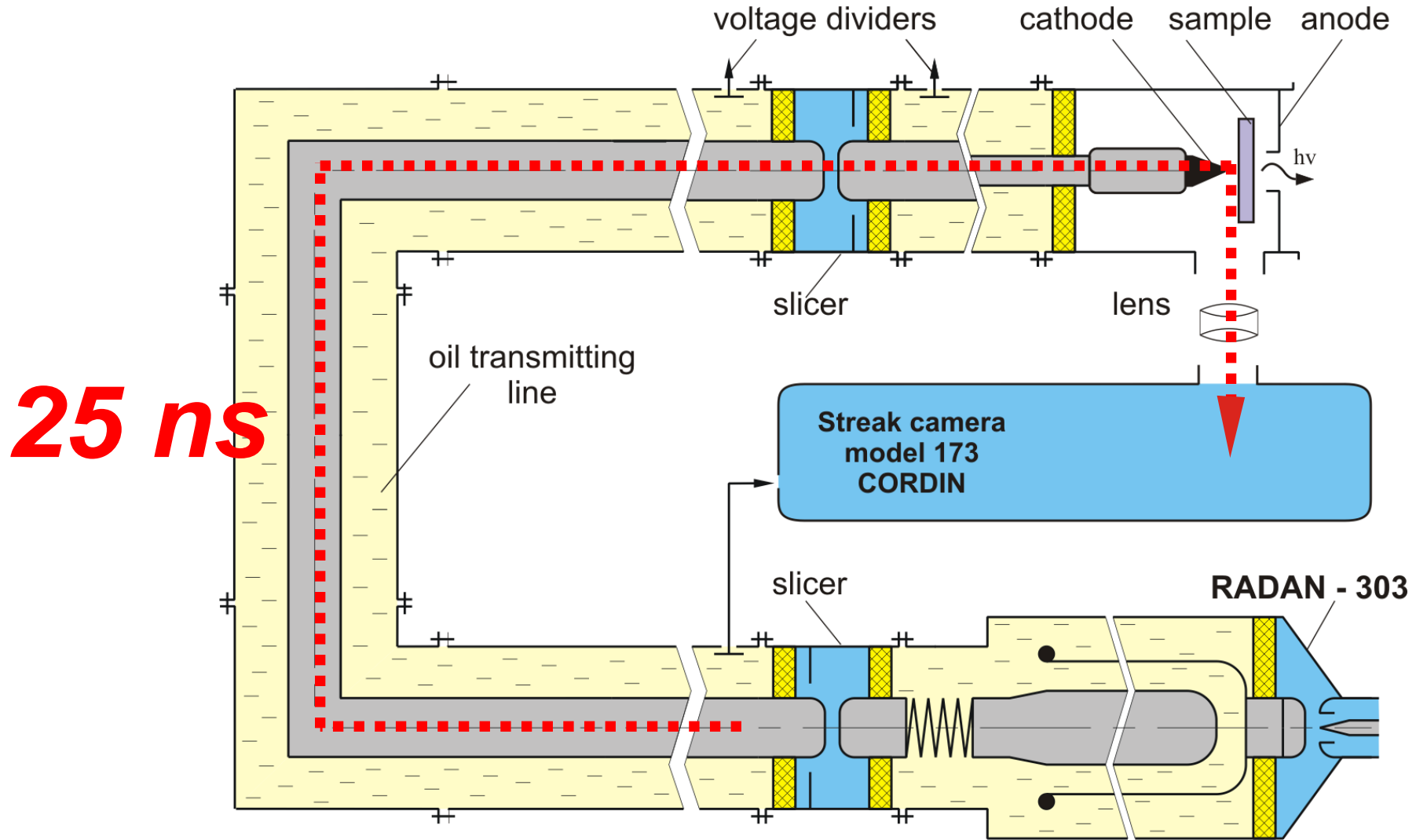




ZnSe radiation spectrum (480 nm).
Width of 10 nm.

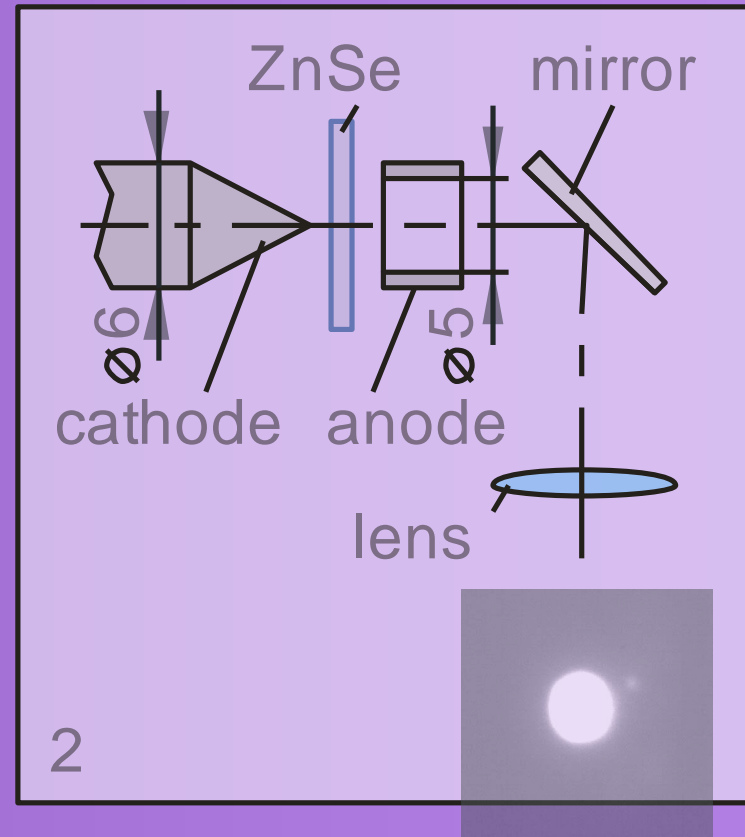
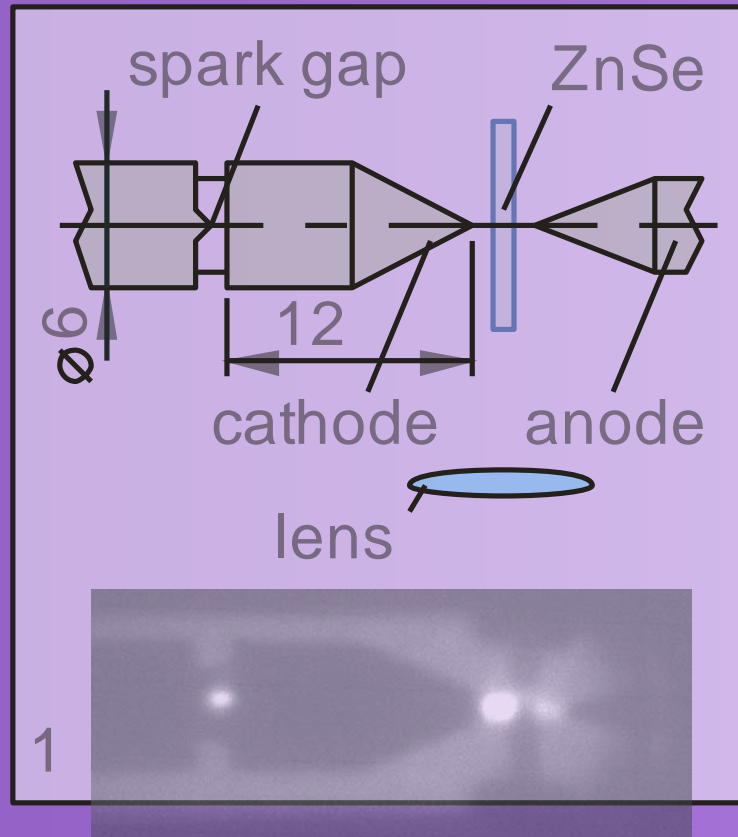


Experimental scheme





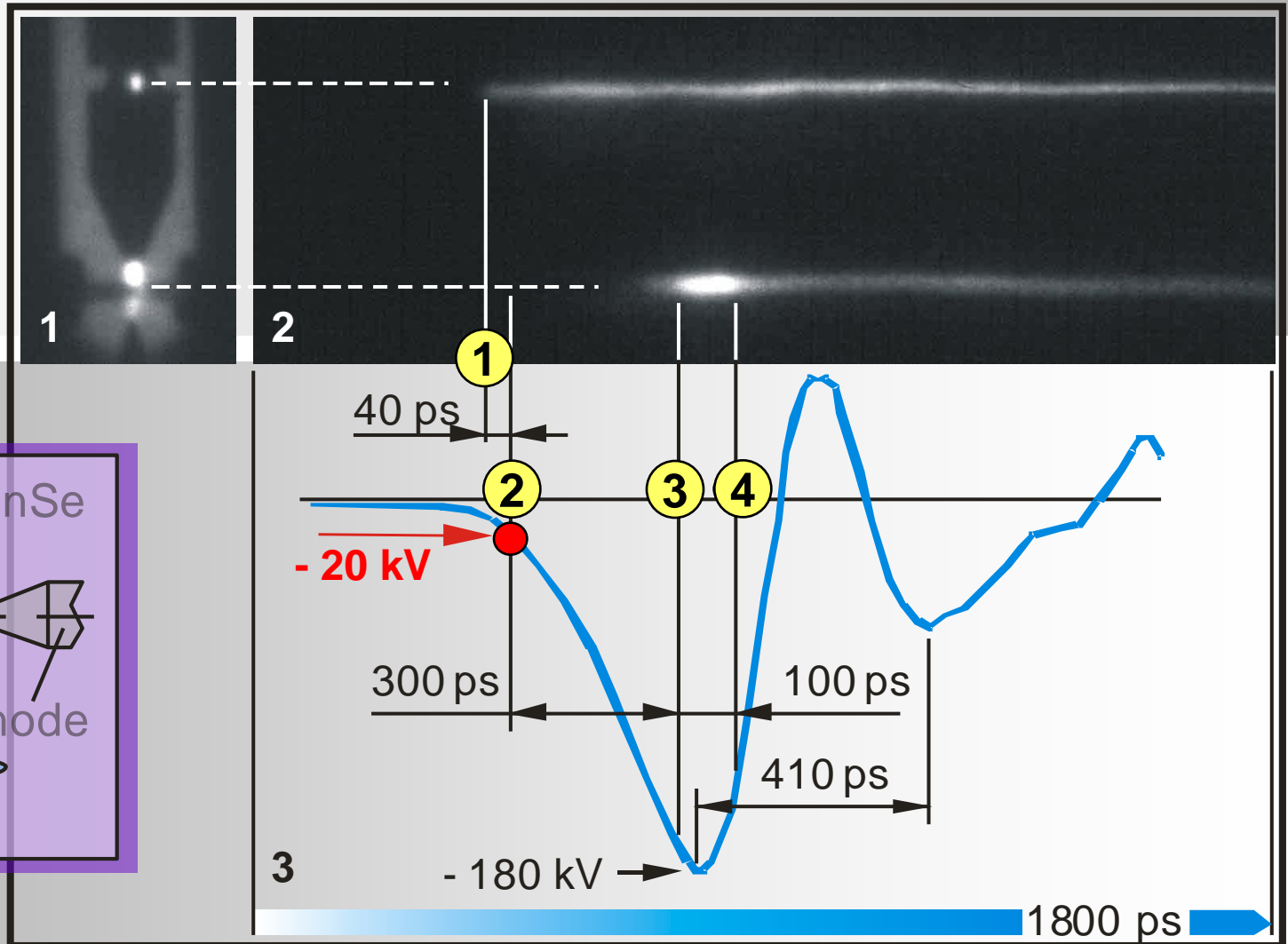
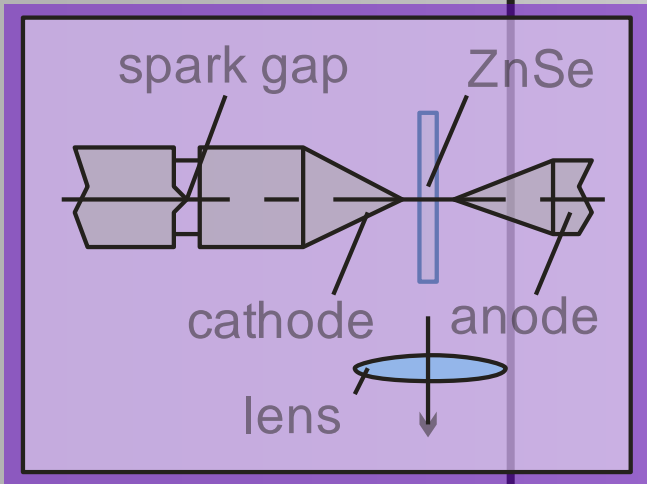
Experimental setup with picosecond streak camera

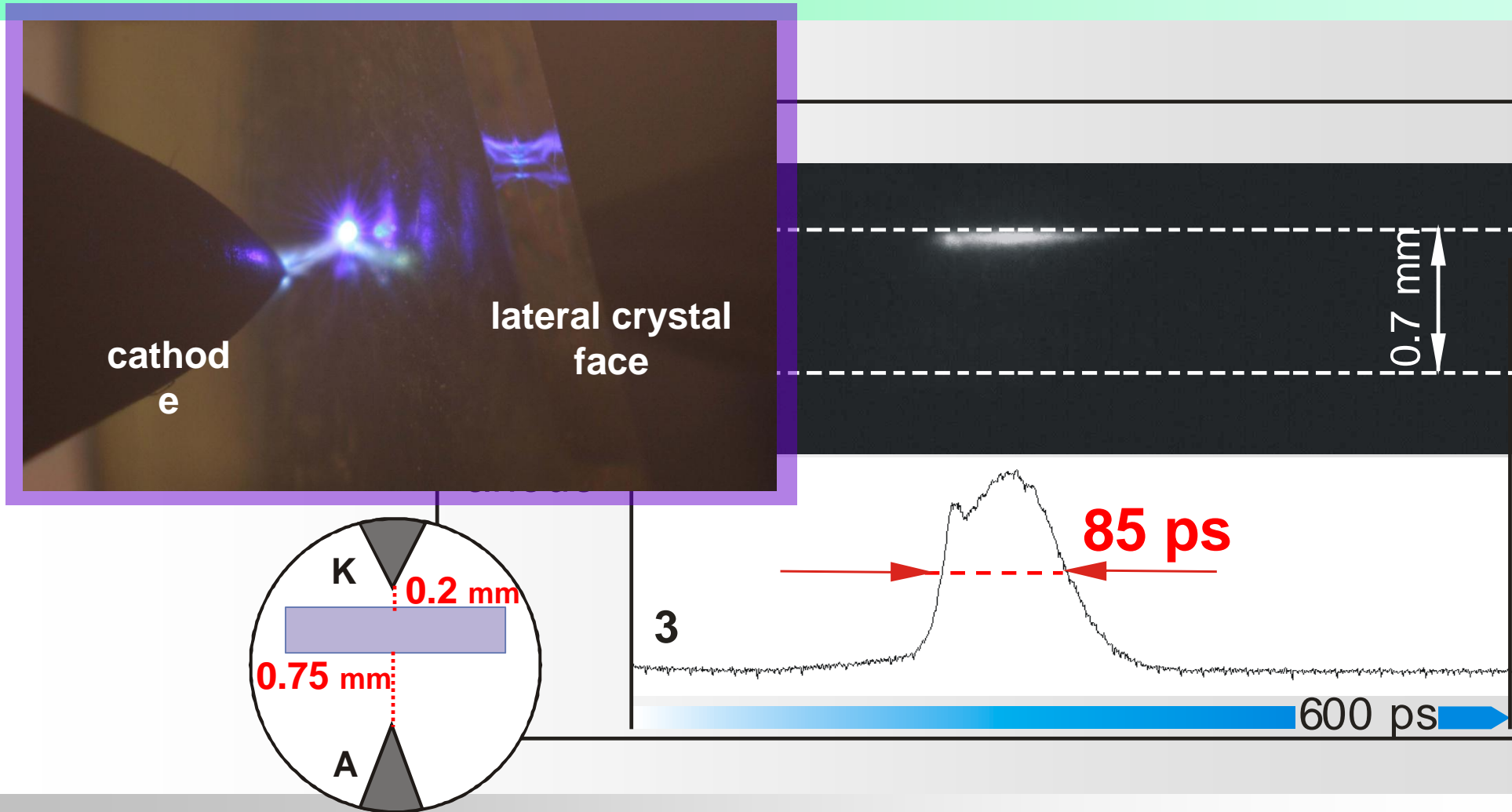


Radiation registration geometry of ZnSe plates under the influence electric field pulses.



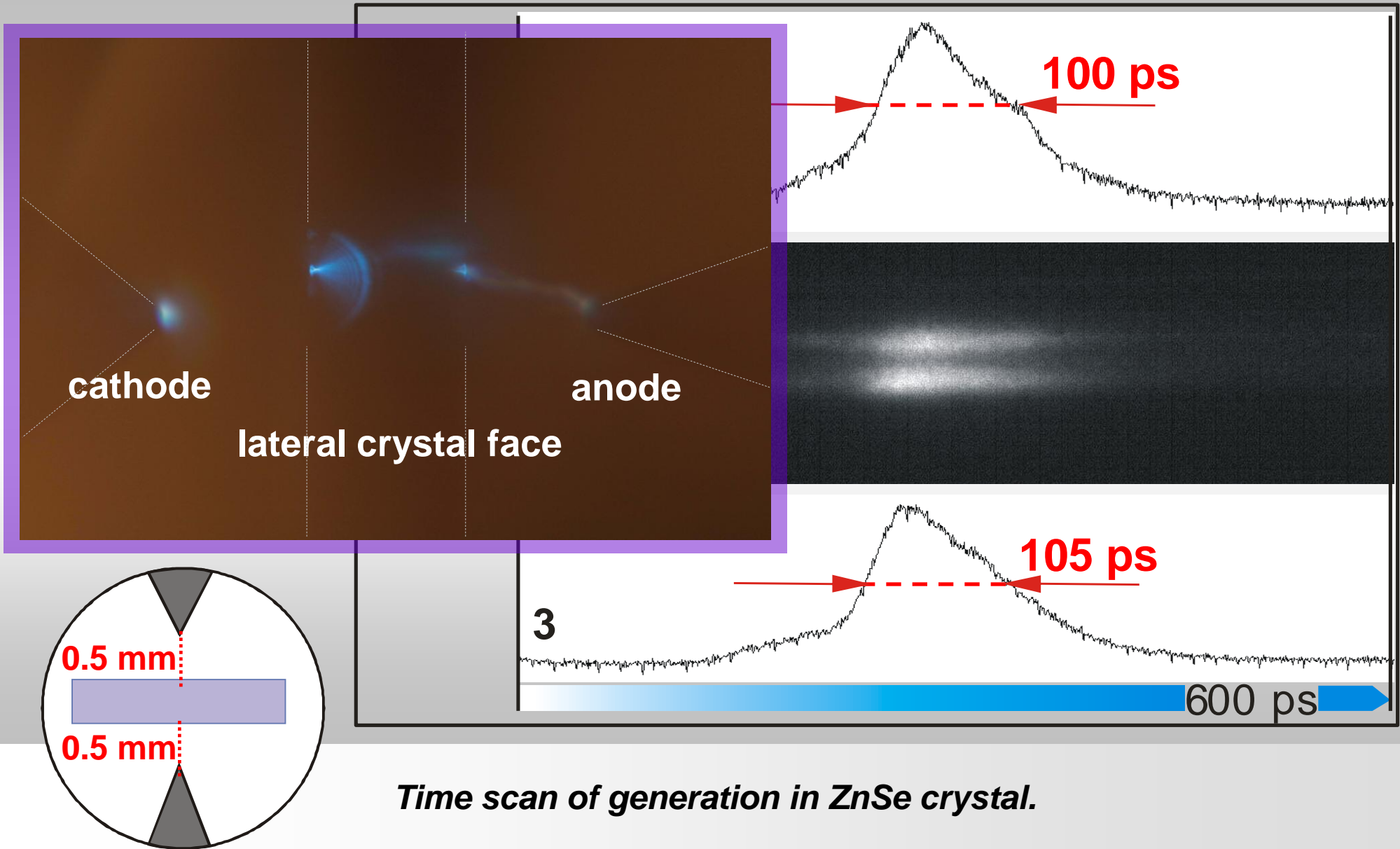
The time synchronization of voltage pulse and generation appearance in ZnSe crystal (time scan of 1.8 ns).





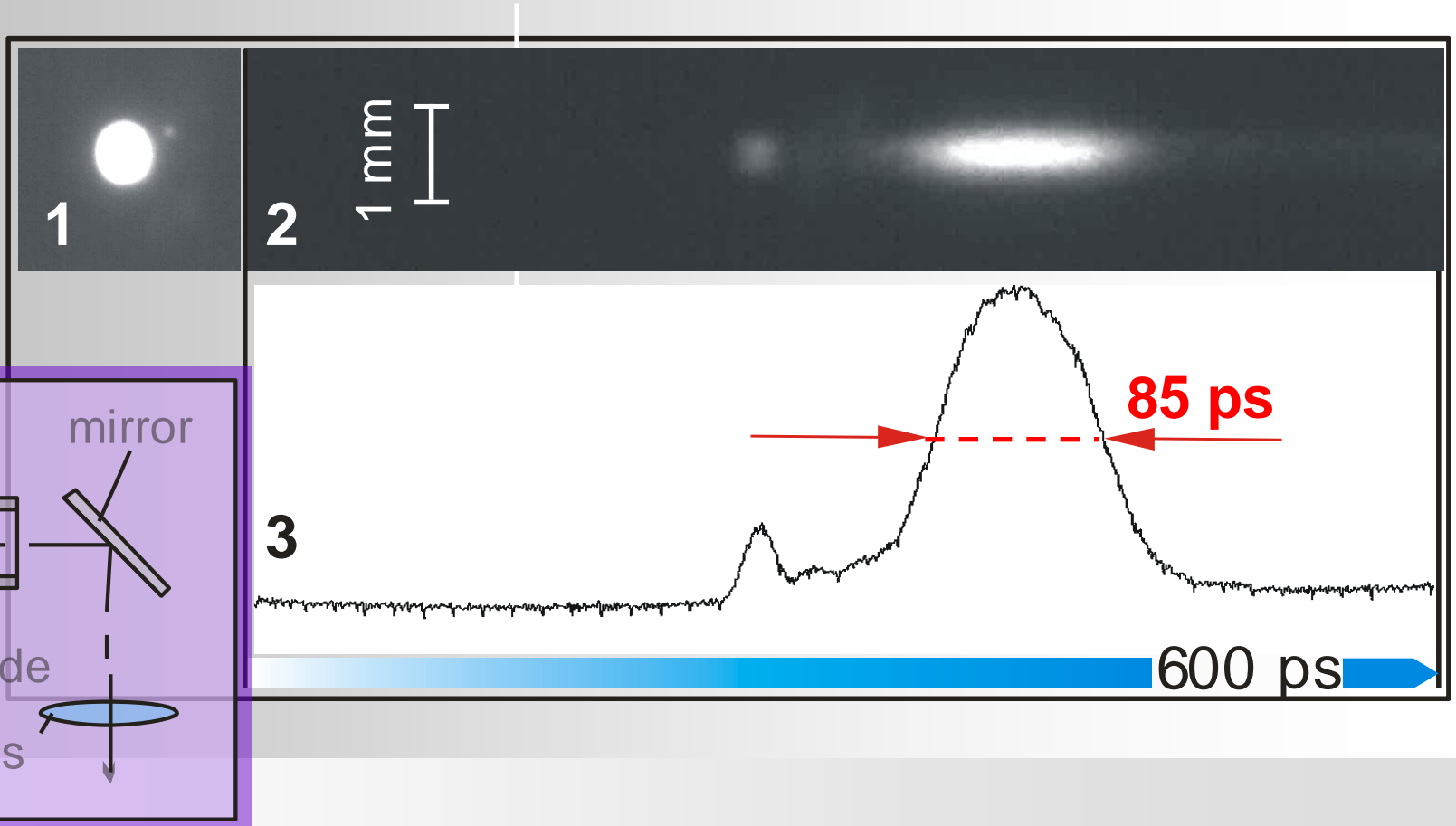
Time scan of generation in ZnSe from a lateral crystal face.





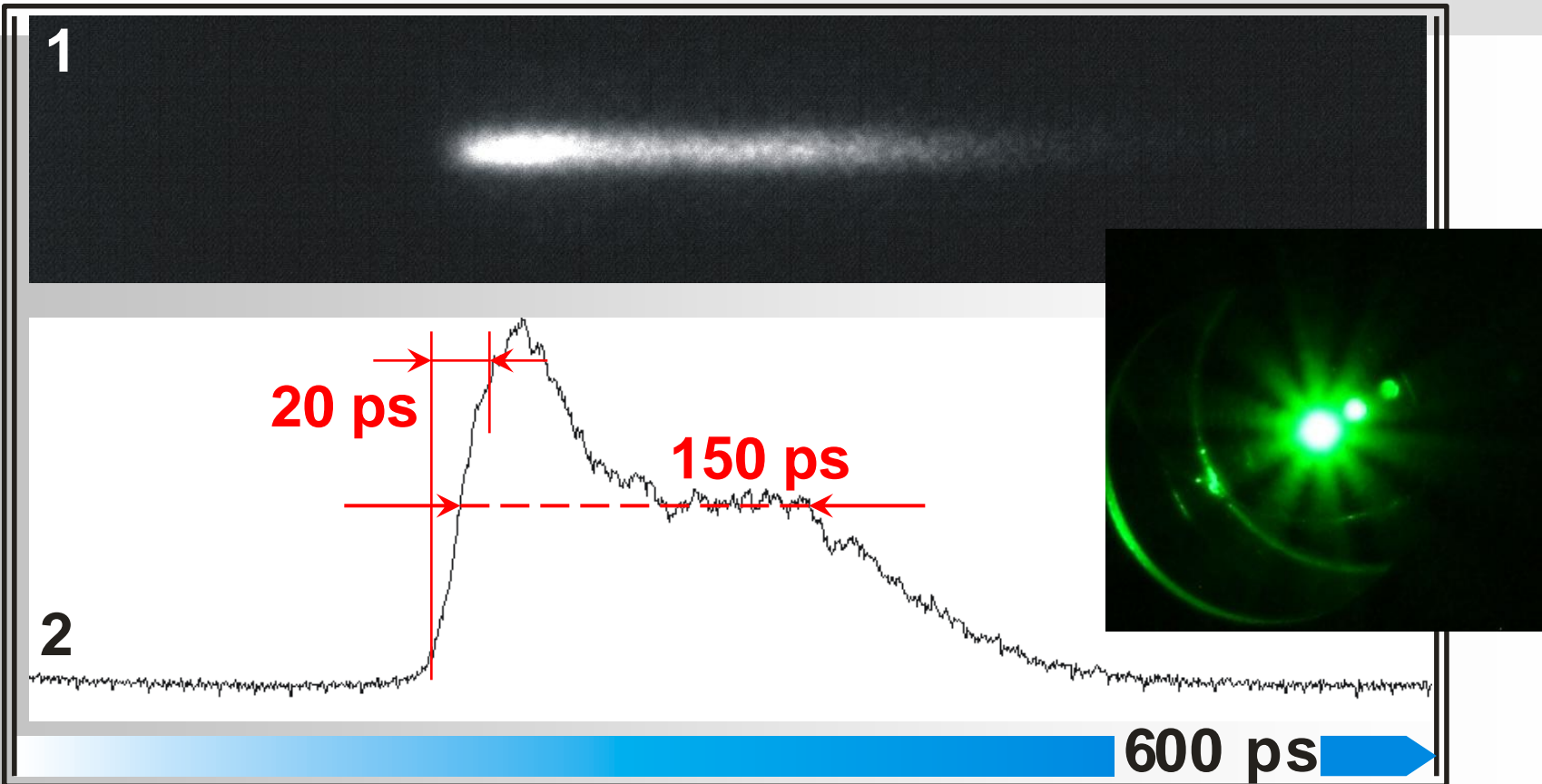
Time scan of generation in ZnSe crystal.





Time scan of generation in ZnSe (1 mm) from a plane crystal face.





Time scan of generation in CdS due to electron beam excitation. Current pulse duration is about 400 – 500 ps (300 A/cm²). Irradiative power is 10 kW.



Summary

For electric field influence, it has been shown that generation has threshold effect and is directly connected with electric field influence on the crystal. The measured radiation duration is shorter than 100 ps. All processes occur near semiconductor surface.

Observation of radiation structure with high time resolution allowed to assume probable influence of electron streams on the sample along with the electric field.

